JAMES A. GRAASKAMP COLLECTION OF TEACHING MATERIALS

V. INDUSTRY SEMINARS AND SPEECHES - SHORT TERM

A. Appraisal Organizations

10. 1978-1979

c. "Contemporary Appraisal - Theory and Case Application", Chapter 55 AIREA, July 28, 1978

Index

CONTEMPORARY APPRAISAL - THEORY AND CASE APPLICATION
Chapter 55 - American Institute of Real Estate Appraisors
1978 Northwest Regional Conference, Sun Valley, Idaho
Friday, July 28, 1978

Presented by Prof. James A. Graaskamp, CRE, SREA
School of Business, University of Wisconsin

I. Basic Concepts (8:30-10:30)

A. Changing Concept of "Highest and Best Use" to "Most Probable Use"

B. Most Probable Use Leads to Most Probable Price

C. Most Probable Use Suggests Most Probable Buyer Profile

D. Project Feasibility Compared to Financial Viability

E. An Appraisal is a Forecast of Property Productivity and Market Behavior

F. An Appraisal is a Feasibility Study for a Stereotyped Client

COFFEE BREAK

II. Logic and Appraisal Report Format (10:45-12:00)

A. Appraisal Logic Structure

B. Appraisal Report Outline (pages 11-13 of The Appraisal of 25 N. Pinckney)

LUNCH BREAK

III. Property Analysis (1:00-2:00)

A. Static Site Attributes (pages 25-51)

B. Legal/Political Land Use Attributes

C. Physical Improvement Attributes

D. Linkage Attributes

E. Dynamic Attributes

F. Environmental Attributes

G. Alternative Use Scenarios

H. Selection of Most Probable Use (pages 52-61)

IV. Market Data Analysis (2:00-3:15) (pages 63-76 + 116-122)

A. Definition of Most Probable Buyer

B. Selection of Appraisal Method

C. Selection of Data Management Method

D. Initial Estimate of Most Probable Price

E. External Influences on Probable Price Transaction Zone

COKE BREAK

V. Appraisal Test and Conclusions (3:30-5:00) (pages 77-88 + 106-114)

A. Is Testing Normative or Predictive?

B. Value Conclusions and Limiting Conditions

C. Open Discussion

I. Basic Concepts

A. The appraiser and the feasibility analyst have recently begun to merge their analytical approaches as revealed by the striking redefinition of the fundamental concept of appraisal, specifically the concept of highest and best use.

1. Highest and best use concept -
"A valuation concept that can be applied to either the land or improvements. It normally is used to mean that use of a parcel of land (without regard to any improvements upon it) that will maximize the owner's wealth by being the most profitable use of the land. The concept of highest and best use can also be applied to a property which has some improvements upon it that have a remaining economic life. In this context, highest and best use can refer to that use of the existing improvements which is most profitable to the owner. It is possible to have two different highest and best uses for the same property: one for the land ignoring the improvements; and another that recognizes the presence of the improvements."
P. 57, Real Estate Appraisal Principles and Terminology, Second Edition, Society of Real Estate Appraisers 1971

2. "Highest and Best Use: That reasonable and probable use that will support the highest present value, as defined, as of the effective date of the appraisal. Alternatively, that use, from among reasonably probable and legal alternative uses, found to be physically possible, appropriately supported, financially feasible, and which results in highest land value. The definition immediately above applies specifically to the highest and best use of land. It is to be recognized that in cases where a site has existing improvements on it, the highest and best use may very well be determined to be different from the existing use. The existing use will continue, however, unless and until land value in its highest and best use exceeds the total value of the property in its existing use. Implied within these definitions is recognition of the contribution of that specific use to community environment or to community development goals in addition to wealth maximization of individual property owners. Also implied is that the determination of highest and best use results from the appraisers judgment and analytical skill, i.e., that the determined from analysis represents an opinion, not a fact to be found. In appraisal practice, the concept of highest and best use represents the premise upon which value is based. In the context of most probable selling price (market value) another appropriate term to reflect highest and best use would be most probable use. In the context of investment value an alternative term would be most profitable use."
Real Estate Appraisal Terminology, Edited by Byrl N. Boyce, Ph.D. SRPA, Ballinger Publishing Co., Cambridge, Mass. 1975

3. At Wisconsin we use two concepts, one representing the ideal solution and one representing the most practical current solution.

a. The most fitting use is that use which is the optimal reconciliation of effective consumer demand, the cost of production, and the fiscal and environmental impact on third parties. Reconciliation involves financial impact analysis on "who pays" and "who benefits" - thus the rash of debate on how to do impact studies.

b. The most probable use will be something less than the most fitting use depending on topical constraints imposed by current political factors, the state of real estate technology, and short term solvency pressures on consumer, producer, or public agency. In short, the appraiser must demonstrate reasonable fit to land use controls, community politics, technical design constraints, effective demand, and viable cash flows for the project.

B. The term "most probable price" avoids the arrogance of "highest and best use" as well as the implication of absolute certainty as to the appraisal conclusion. Moreover it recognizes that pure economic logic for the property owner will be limited by the impact on community as perceived by land use administrators and the impact on investment risk as perceived by potential investors in the market.

1. An appraisal is first a feasibility of a site in search of a use;

2. Alternative uses suggest alternative tenants and/or buyers

3. Appraisal must forecast what the most probable buyer will pay to benefit from the most probable use

C. Most probable use immediately reduces the market to a particular segment of space users and suggests both the tenancy and the investor group who will be interested.

1. Proper market segmentation of possible tenants determines the degree of monopoly pricing and stabilized revenues which the project may enjoy.

2. Proper segmentation of the most probable buyer leads to selection of relevant comparables or in the absence of sales data, relevant assumptions on how the most probable buyer might behave in pricing the property.

D. Feasibility is a non-financial concept of fitting a real estate solution and service package to a context of public priorities and customer needs.

1. The project must fit the general market, a specific consumer group, the environmental limits of the land, the nature of existing usable improvements, legal and political controls imposed by the public, the need for compatibility with the total and natural man-made environment, and the limits of physical design construction.

2. Financial viability relates to the reasonableness of a set of financial assumptions which may be bought by a knowledgeable investor, relating proforma estimates of the future to justified investment parameters.

3. Investment risk is the variance between assumptions and future realizations and the sensitivity of success or failure to certain key factors which cannot be confirmed as fact by the appraiser as generalist or by the appraiser who is not clairvoyant.

4. The most probable use is one which will fit basic constraints and provide financial viability with a tolerance for surprise (risk) that is acceptable to investors of a certain type.

E. An Appraisal is a forecast of productivity of a property relative to the needs of a certain buyer group and a prediction of the price at which it would sell to the most probable buyer.

1. Anticipation of an economic behavior by the buyer leads to the highest price he would be willing to pay.

2. Anticipation of the behavior of the seller leads to an estimate of the least he would be willing to accept.

3. Analysis of the influence of outside factors affecting price supply and demand leads to an estimate central tendency between buyer and seller maximum.

4. The upper and lower ranges specify a transaction zone within which a most probable price will occur. The most probable sales price does not need to be at the center of the zone nor do the alternatives need to follow a normal distribution curve. The zone and the distribution most typically are statements of verbal probability.

F. An appriasal is therefore a feasibility study of alternative courses of action and these alternatives are matched to the most probable user/investment group to be seeking such a property opportunity at that time.

The appraisal process as a feasibility study lends itself to the following logical process;

1. What is the problem for which the appraisal is to serve as a benchmark?

2. Which definition of value would best serve the decision process?

3. What does an inventory of site attributes reveal as to the positive and negative contributions of the site to alternative uses?

4. What does an inventory of improvement attributes existing on the site reveal as to the positive and negative contributions of the improvements to alternative uses?

5. What basic alternative use programs or scenarios may be considered as plausible alternatives motivating buyers as of the date of the appraisal?

6. Which alternative use appears to be the most probable use when screened by external factors including effective market demand, political controls, forecasting risk, and potential profitability as percieved by investor/buyers.

7. What is the profile of the most probable buyer/investor for the most probable use to the degree that the profile can define the search for comparable transactions?

8. Could the appraiser simulate the purchase guidelines of a most probable buyer group if there were no sales which were thought to be comparable and appropriate to the subject situation?

9. What is the value to be justified by the appraiser using normative, traditional measures of what a buyer should do, such as the cost approach or conventional income approach?

II. Property analysis to determine alternative uses.

A. Elements of analysis are approached as an inductive research problem moving progressively from on-site facts to external conditions. The appraiser needs to examine the following elements in sequence:

1. Physical attributes of site and improvement.

2. Legal-political constraints on alternative uses.

3. Basic financial parameters of alternative uses.

4. Existence of effective market demand for remaining alternatives.

5. Comparative risk and return evaluation of alternatives for which there may be demand.

B, A physical analysis of inventory of site and improvement attributes should include the five following subsets:

1. Physical attributes (static) include site dimensions, soils, geology, topography, site improvements and capacity, and on-site flora and fauna.

2. Legal/political attributes including not only zoning and subdividing codes at the local level but also relevent federal, state, or private controls which might direct or restrict site use. As appropriate, the appraiser should note administrative patterns relevant to use of subject site.

3. Linkage attributes identify relationships of site to networks, populations or activities centers that might generate potential demand for the subject property.

4. Dynamic attributes are those attributes which exist in the mind of others in terms of status, anxiety, beauty, imagery, sentimentality or other perceptions which attach to the subject property to the degree that these are economically significant.

5. Environmental attributes of the site relative to off-site natural systems of which the subject property may be a part such as riparian rights, pollution down wind, storm water runoff, etc. Even the shadow cast by the structure off-site may become significant in the era of solar energy. Impacts on others may be perceptual (i.e. dynamic) or fiscal (legal/ political) as well.

C. Static site attributes which begin to narrow the potential market to alternative uses should include both the facts and their implications for productive use in such topic areas as:

1. Size, shape, and lot area

2. Topography, soils, geology, slope stability, and potential for subsidance, etc.

3. Water table, wells, streams, ponds, storm water swales, shoreland edges, and bulkhead lines, floor plains designations, etc.

4. Environmental attributes of flora and fauna which might cause environmental impact litigation

5. Concealed utility easements, old foundations, etc.

6. Existing utility services and capacity

7. Access points to public thoroughfares or private right-of-ways

8. Site improvements such as paving, retaining walls, pedestrian paths, culverts, etc.

9. Landmark attributes or historical site features

D. An inventory of legal attributes should move from specific site controls imposed by local zoning ordinances to state and federal regulations as well as private controls which may intervene. The appraiser has an obligation to report foreseeable attitudes or future legislation which will affect administration of these ordinances relative to future uses of the site.

1. All alternative setback lines and building envelope interpretations relative to site

2. Legal uses under applicable zoning and critical limitations of each relative to FAR, bulk, parking requirements, DU count, etc.

3. Special zoning options which may be available at owners option such as rezoning, downzoning, PUD zoning, etc.

4. Special controls imposed by extra-territorial zoning, tax conservancy commitments, subdivision process, urban renewal districts, tax increment districts, etc.

5. Special state or federal constraints under airport approach zone districts, harbor commissions, coastal zones, Office of Environmental Protection Agency, etc.

6. Public attitudes of public commissions for sewer, water, highway, planning, or building administration

7. Public and planning premises of community master plans relative to sprawl, restoration, redevelopment, and other land use priorities as these attitudes will affect administration of the law.

8. Existing or impending legislation relative to such matters as:

   a. Septic tank installation
   b. Water quality for ground water, water recharge areas, storm water runoff, salt water encroachment, etc.
   c. Air quality standards relative to use, HVAC performance, micro-climate interference, etc.
   d. Conservation of environmental edges, prime agricultural land, wet lands

E. Static attributes of structures are more intertwined with building codes and ordinances so that physical and legal attributes might be considered together to avoid repetitive discussion.

1. Classification of structure as to type under both economic and engineering jargon (Ex. 3-story retail, ordinary construction with elevator)

2. Computation of square footage and cubage to establish building code jurisdiction level

3. Definition of structural system, bay spaces, ceiling heights, etc.

4. Delineation of foundation system, structural system, exterior wall system, interior wall system and vertical circulation system.

5. Delineation and analysis of HVAC system (including BTU budget)

6. Accessibility to the hadicapped if regulated, to delivery, to customer parking, to fuel delivery points, to solid waste pickup points

7. Penalties for fire insurance rating system, flood plains, sprinklers, et

8. Non-conforming features which create renovation or remodeling

9. Public controls on possible alternative special uses such as restaurants, places of public assembly, schools, etc.

F. Analysis of the static and legal/political attributes of site and structure should be summarized in terms of competitive advantages and disadvantages of plausible alternative uses for costs, pricing, marketing, and political administration of compatibility.

1. Some static attributes may help identify most probable user types (Ex. special display window sizes may be suitable for antique or art display) while attributes will make certain uses unlikely (Ex. floor load limitations of fire proofing weights required of places of public assembly).

2. Some static or legal attributes can provide monopoly advantages because suitability is unique relative to lands all around it, because of exemption from certain regulations, or existing approvals of development plans, including licenses for dredging, building code variances, etc.

3. Some attributes lead to higher cost which the front door approach may reveal as leading to excessive rents or prices.

G. Linkage attributes relate to subject property to both networks of supporting infra-structure which contributes toward effective demand for the property as economic space time or the supply and demand impact of related activity centers which may interact with the subject property.

1. Analysis moves best from the borders of the subject property outward to expanding zones of potential demand or competitive supply.

2. Utility services are network linkages in terms of:

a. Limitations on sewage processing, storm water retention or runoff constraints
b. Community energy supplies, priorities, and capacity
c. Water processing and chemistry as applicable
d. Possible dependency on resources such as wild game and fish, underutilized labor pools, fire department coverage zones, etc.

3. Street, sidewalk, rail, and public transit systems including access points, traffic department controls, etc.

4. Relationship of subject site to contiguous properties, balance of city block, and neighborhood layout pattern.

5. Relationship of subject site to generators of potential needs and uses for the subject site, such as:

a. Employment centers
b. School system alternatives
c. Retail services
d. Complimentary existing nearby uses
e. Recreational services
f. Health care systems
g. Security systems
h. Waste disposal services

6. Neighborhood demographics (population, age, employment, income, etc.)

7. Relationship to competitive alternative and estimate of supply of available space, competitive ranking, and exposure of subject site to competitive interception of potential demand.

H. Dynamic attributes are those characteristics which exist in the minds of the beholder, which are mental or emotional responses which a site or project stimulates and which affect decision making behavior.

1. Image conditioning of the approach zone

2. Visual factors in terms of prominence of the site, views from the site, potential for controlled sight lines, etc.

3. Prestige and status

4. Anxiety factors of access and security

5. Noise as a function of traffic count (FHA noise pollution manual)

6. Prevailing air currents and airborne pollution (phosphate plants or sulphite paper mills, for example).

7. Political images established for a site by the public positions of local politicians or vested interest groups.

8. Historical community reputation and values attached to the project site and structures.

I. Environmental attributes of the site recognize that the real estate product today must respond not only to the needs of the individual consumer in the marketplace but to the collective community of consumers represented by the community political administrators. Land use must be sold to both "markets." If the proposal won't sell at City Hall, there will be little opportunity to market the product individually. Pre-architectural programs must not only consider physical factors of environmental impact off-site, but in addition:

1. Silhouette of social impact in terms of public perceptions of:

   a. Displacement of existing residents and neighborhood units
   b. Contribution to social integration or mobility barriers
   c. Contribution to land use heterogeneity
   d. Contribution to regional and community master plans

2. Fiscal impact on the community where appropriate:

   a. Direct impact on real estate tax revenues
   b. Direct impact on other governmental revenue
   c. Direct impact on incremental government
   d. Secondary contributions to local government revenues
   e. Secondary cost burdens created for local communities

3. Social factors in the ethical environment:

a. Impact on supply/demand equilibrium
b. Stamina of project sponsor in the face of public pressure
c. Vulnerability of potential project buyers to secondary political pressures and counter attack
d. Potential uses requiring unique political resources or private/public consortiums

J. For the experienced real estate analyst systamatic narrowing of alternative uses from study of the attributes leads to a limited series of alternatives which can then be given a final screening in terms of preliminary financial analysis and effective demand. The analyst may review these attributes to identify alternative uses by emphasizing one or more of the following angles of inquiry.

1. Does any site of site attributes suggest a special space/time - to money/time configuration? For example, a high floor area ratio but little parking may suggest a building with a low person occupancy, such as a switchboard building or luxury apartment with minimum number of dwelling units.

2. What attributes of the subject site provide monopoly characteristics or are inferior to alternative sites?

3. What patterns in adjacent or competitive structure represent a trend to which the subject property should adapt?

4. What patterns of use is revealed by transactions in similar properties on nearby locations?

K. A program of use or reuse can be called a scenario and may be suggested by physical characteristics of the property, contiguous property trends and conditions, or known supply shortages with which the appraiser is familiar. Some examples of scenarios are provided in Exhibit 1.

L. Ranking of these scenarios for economic power is accomplished by means of the Back Door approach, i.e., the revenue justified investment for the property, as is alternative whrksheets for this approach using the default point and the debt cover ratio as the critical conversion of income to capital are provided in Exhibits 2 and 3 and 4 and 5.

M. Economic power has to be qualified in terms of marketing risks and capital budgeting risks of each of the alternative uses before alternative uses can be ranked in summary fashion as in Exhibit 6.

1. Note that Exhibit 6 integrates the basic elements of preliminary feasibility analysis.

2. Remaining disucssion will emphasize market risk which is the primary cause of misleading appraisal conclusions

III. Market Analysis for Real Estate Appraisal

Market analysis for an appraisal is concerned with two very different actors in the marketplace. To select the most probable use of the property, it is first necessary to define the prospective users in terms of both price and supply of available space. The second level of market analysis is in the selection or most probable buyer and the related problem of identification of comparable sales or the appropriate buyer calculus for comparable properties.

A. It is the responsibility of the appraiser to demonstrate effective demand for the space which he is appraising rather than to follow the practice of recent years of appraising for mortgage loan purposes with the subtle condition that the value is on a if, as, and when completed and rented basis. That burden on the appraiser is clear from the definition quoted previously.

B. Buyers may purchase for use or may purchase the investment income generated by tenant users or buyers of individual units such as lots and condominiums. Correct identification of alternative buyers in the market matched to property attributes will remove some portion of the error inherent in selection of properties which may appear to be similar in locale but represent significantly different user types and price structures.

C. Real estate market analysis is the use of basic aggregate data to scale the enterprise and measure the rate of absorption of specific real estate units overall.

   1. Number of single family lots platted and sold on the west side of a certain city.

   2. The amount of A class office space built, available for rental and rented in a given downtown area (Exhibit 7).

D. Merchandising data is generally primary information or assumptions by the analyst about specific competitive projects and specific user groups which will permit an estimate of what percentage of the opportunity group can be captured by a single process.

   1. For example, sales may reveal small buildings bought by users, large buildings bought by developers for conversion and in two blocks under improved parcels were being bought for assemblage.

   2. Office sites might be bought by developers, home office builders, or professional groups for use and tax shelters.

E. Market comparison data has to do with property sales in the local or of the type relevant to the subject property which will allow the appraiser to research the motivation of investors in order to profile alternative buyer groups and price patterns to select the most probable buyer group implied by most probable uses of the subject property.

   1. For example, sales may reveal small buildings bought by users, large buildings bought by developers for conversion and in two blocks under improved parcels were being bought for assemblage.

2. Office sites might be bought by developers, home office builders, or professional groups for use and tax shelters.

F. Market segmentation is key to control of unexplained appraisal error.

G. Appraisal is concerned with the competitive standard and market history; developers are concerned with pricing from a monopoly position achieved by creating a competitive edge.

1. The competitive standard determines the value attributable to the real estate.

2. The competitive edge reflects the value created by entrepreneurship in finding and merchandising to a market gap.

3. The difference represents the fight between real estate value and mortgage loan value when mortgage lenders lend on capacity of the borrower.

H. The front door approach (the cost required rent structure approach) measures the rent required of the entrepreneur and the competitive edge. Thus the appraiser can show the lender the marketing target of the entrepreneur in terms of aggressive value that might be created and use the back door approach to show the defensive position of the project as real estate under average management.

Exhibit I

B. Alternative Uses for the Simpson Property

A combination of the physical characteristics of the property and the general demand characteristics on the Square suggests the following alternative scenarios for use of the subject property (Appendix C):

Scenario #1: The building would be demolished and the site leveled and paved to provide monthly reserved parking for employees of various nearby public and private offices and firms. It is assumed that space for 18 cars could be provided and that the only access would be from the alley; an attractive screening wall with plantings would face Pinckney Street.

Scenario #2: The present building would be demolished and replaced with a new three-story office building, 66' square. There would be two retail stores at the first floor level, an office lobby, a single elevator, required stairwells, and no basement. The structure would use economical masonry-bearing wall construction and provide 8-10 parking spaces at the rear of the building.

Scenario #3: The present building would be retained, except for demolition of a minimum of a one-story space at the rear, which would improve delivery and parking. Only the first floor would be used, subdivided into three retail units. The larger building would provide two stores approximately 20' X 80', while the smaller structure would provide a single gross area of 20' X 75'.

Scenario #4: The present structures would be retained and modified as in Scenario #3, but in addition, the second and third floors would be remodeled to provide five office suites that would take advantage of a renovated atrium area with skylight at the second-floor level.

Scenario #5: The present structures would be retained and modified as in Scenario #3, but in addition, the second and third floors would be modified to create four townhouse suites in the three-story structure. The two-story store building would be modified to create second floor office space of two 700 square feet modules; skylights would relieve the narrow depth of the building.

The Appraisal of 25 N. Pinckney: A Demonstration Case for Contemporary Appraisal Methods, James A. Graaskamp, Landmark Research Inc., 1978, Madison, Wis., pp.56-57.

EXHIBIT 2

Basic Back Door

I.	Justified Mortgage Amount		
	Gross Income		25,034
	Default Ratio	*	.65
		=	16,272
	Real Estate Taxes @ 20 %*	-	5,007
	Expenses @ 0 %*	-	0
	Cash For Debt	=	11,265
	Mortgage Constant	÷	.104832
	Justified Mortgage Amount	=	107,460
II.	Justified Equity Contribution		
	Gross Income		25,034
	1.0 - Default Ratio	*	.35
		=	8,762
	Vacancy @ 0 %*	-	0
	Cash Throw Off	=	8,762
	Before Tax Equity Rate	÷	.15
	Justified Equity Contribution	=	58,413
III.	Justified Project Budget		
	Justified Mortgage Amount		107,460
	Justified Equity Contribution	+	58,413
	Justified Project Budget	=	165,873

* % of Gross Income

Exhibit 3

BACK-DOOR APPROACH

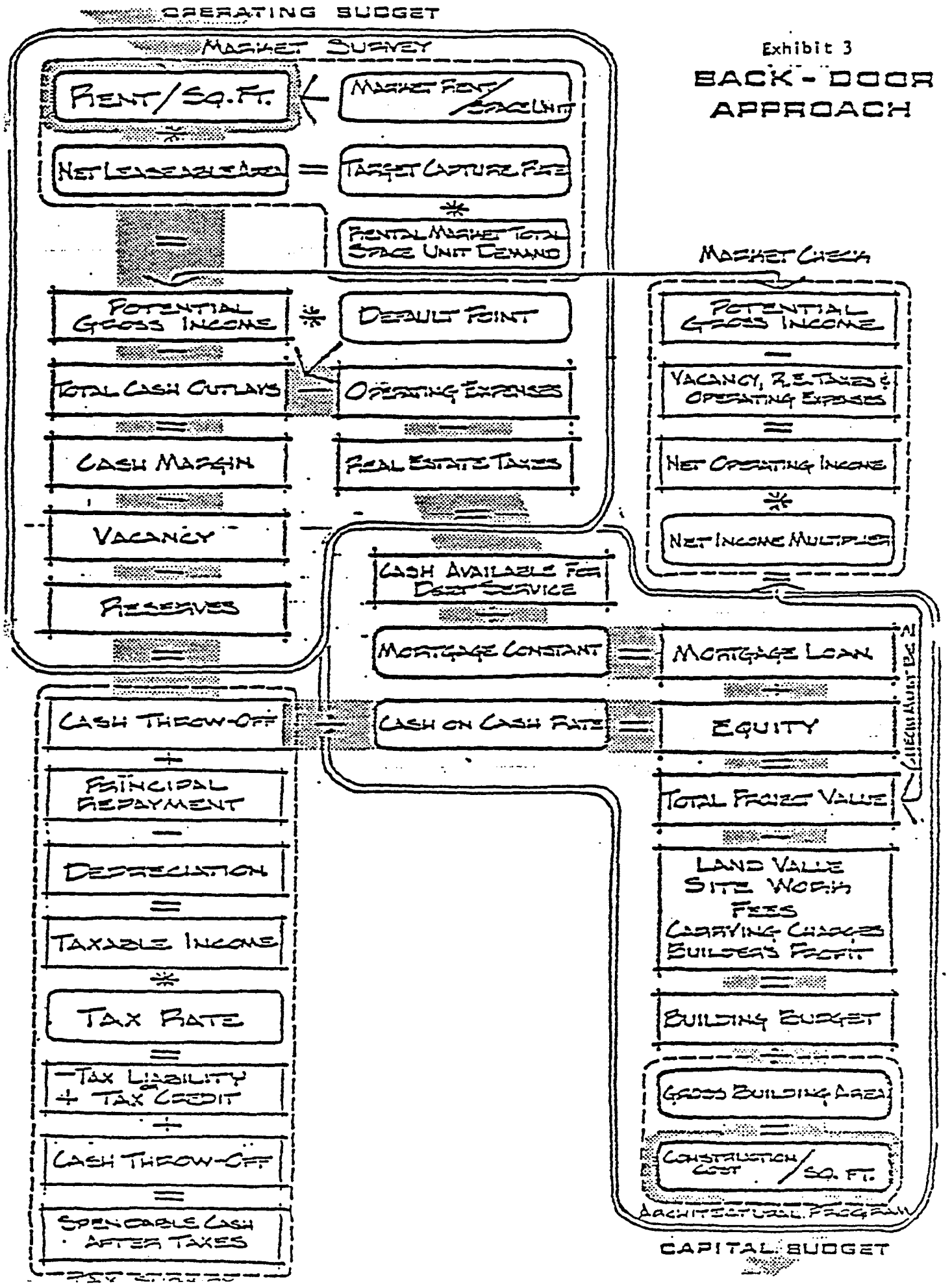
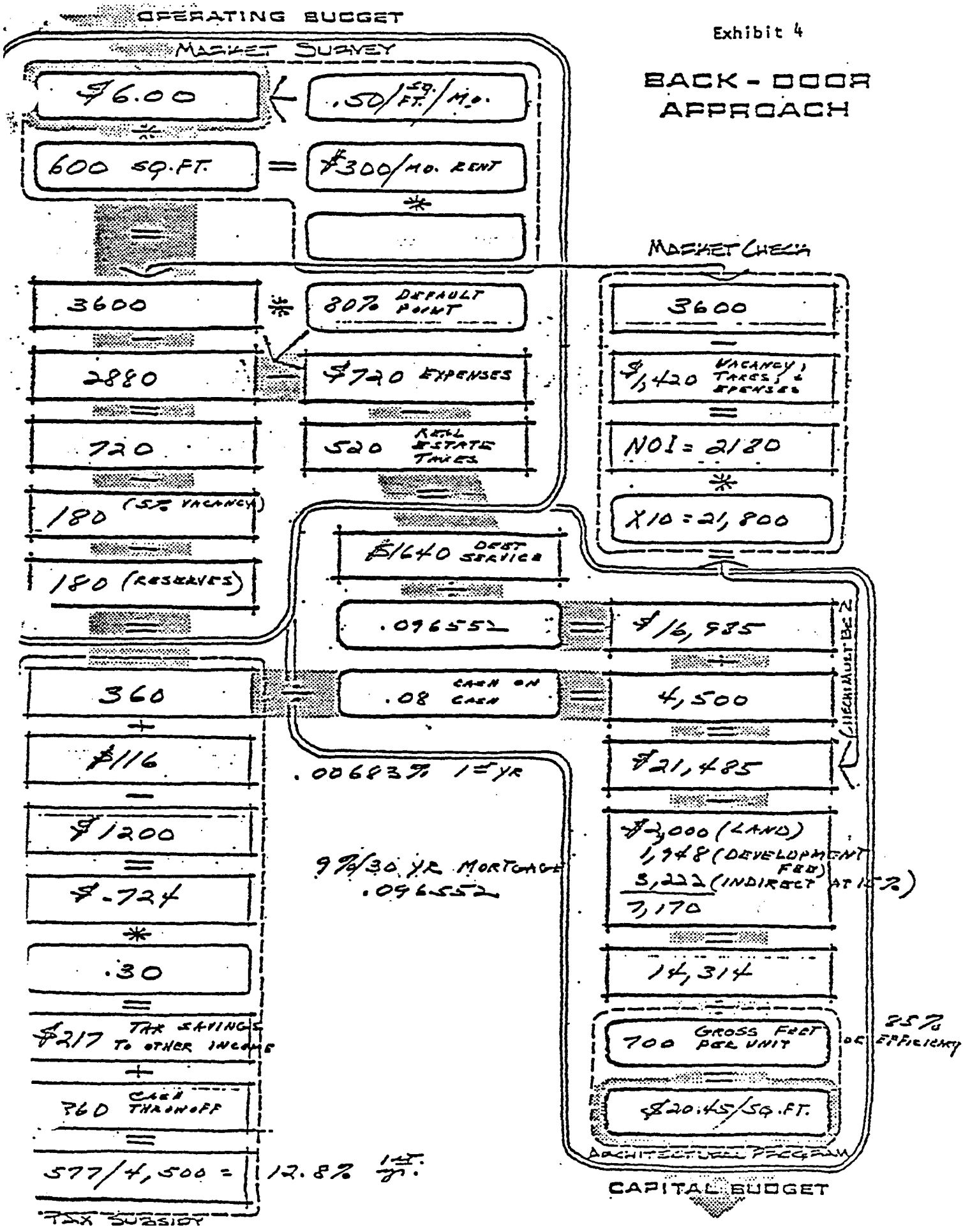


Exhibit 4

BACK-DOOR APPROACH



CASH FLOW MODEL SIMULATION FOR LAND DEVELOPMENT VALUATION
(Tabs for Worksheet Using Quarterly or Six Month Periods)

1. Market absorption in units(Schedule A)
2. Capture rate of subject project (Appraiser assumption)
3. Number of units sold per period (Line 1 x 2)
4. Average price per unit (Appraiser assumption)
5. Gross sales revenue (Line 3 x 4)

    Less: Discounts for bulk purchase (footnote)
    Closing costs (footnote)
    Special assessments paid (footnote)
    Commissions paid (footnote)
    Debt release payments on units sold (footnote)
    Paper taken back by seller (footnote)

6. Net cash from sales

    Plus: Interest income on past period paper (footnote)
    Miscellaneous income (footnote)
    Less: Administration (footnote)
    Professional fees (footnote)
    Interest on outstanding debt (footnote)
    Real estate taxes on vacant land (footnote)
    Real estate taxes on unsold units (footnote)
    Income taxes (optional)

7. Cash available from operations for capital investment

    Plus: Cash available retained from previous period
    Cash principal from previous period credit sales
    Cash from new debt
    Cash from new equity contributions

8. Total cash available for capital improvements and distribution
    Less: Land payments (Schedule B)
    Construction in place (Schedule C)
    Contingency (footnote)

9. Cash available for distribution

    Less: Cash retained for internal financing (and taxes)(footnote)

10. Cash distributed to investors
11. Present value discount factor
12. Present value of periodic distributions
13. Present value of residual properties (end of projection series)

CONTEMPORARY REAL ESTATE APPRAISAL SEMINAR

SECOND AFTERNOON

1:00-2:30 p.m.

I. Inferring Future Price From Sales Data

A. For residential properties there are often many sales of similar properties so that powerful statistical tools can be brought into play, such as multiple regression, factor analysis, etc. However, the simple average can also lend itself to statistical inference.

B. Dispersion is the variation or scatter of a set of values. Measures of dispersion are needed for the following basic purposes:

1. To gauge the descriptive reliability of averages.
2. To serve as a basis for control of the variability itself (such as rejecting a comparable that lies outside a certain range).
3. To summarize facts, both an average and a measure of dispersion should be presented.

C. When dispersion is small, then the selected average is a typical value in that it closely represents the individual values in the set and it is reliable in that it is a good estimate describing the typical case in the population. It is a useful generalization. Conversely, an average with very great dispersion is not very descriptive of the data set and may be a misleading generalization.

D. Measures of dispersion include:

1. A range
2. The quartile deviation
3. The mean deviation
4. The standard deviation

E. Consider the data on some apartment site land sales in Madison provided in Exhibits 1, 2, and 3. The range is the difference between the largest and smallest values of the variable:

1. $5.60 - $6.50 per square foot of land or 90¢
2. $1970 - $2208 per dwelling unit built or $238
3. $3.72 - $4.23 per square foot of gross building area or 51¢
4. $1226 - $1327 per total number of rooms built or $101

F. Exhibit #3 shows the mean and the standard deviation of the mean.

G. Quartile deviation must be applied to group data which are ranked from high to low. First the data is divided at the median and then each half of the data is split in half once again. Consider the net rentals of older supermarkets under existing leases provided in Exhibit #4.

Exhibit #4

CUMULATIVE FREQUENCY DISTRIBUTIONS
Supermarket Net Rents for 214 Stores in Chain X

(1) New Rent per Square Foot	(2) Number in Class with Lower Limit Shown	(3) Number Earning Less	(4) Number Earning as Much or More
$2.25	2	0	214
2.35	23	2	212
2.45	49	25	189
2.55	63	74	140
2.65	45	137	77
2.75	25	182	32
2.85	3	207	7
2.95	4	210	4
3.05	0	214	0
Total	214	1051	875

H. In the full array of data, the value of Q_1 and Q_3 are found to be $2.50 and $2.70, meaning 1/4 of the properties generate less than $2.50 a square foot and 1/4 exceed $2.70 per square foot while the middle half fall between these values. The quartile deviation is then (2.70 - 2.50)/2 or 10¢, or stated another way the range of the second and third quartile is about 10¢ per square foot.

II. When comparable sales have only one dimension, such as net leaseable area or number of rooms, a direct mean and some of the squares dispersion test is possible. However, usually it is necessary to consider a variety of factors and discover how price changes relative to the net differences of each property. Linear regression is one such method.

A. Ratcliff in Chapters 6 and 7 demonstrates a point system which ranks properties and is then weighted by buyers priorities. The weighted points are then compared to unit price. This system may be too elaborate for houses but can be demonstrated on a variety of commercial properties.

B. Consider the evaluation of vacant industrial land in Exhibits 5, 6, and 7.

1. Point system should be kept simple. 1-3-5 indicates below average, average, and above average.
2. If the appraiser is capable of making more careful distinctions between comparable properties, he can use a ten point scale such as 0, 4, 6, 8, 10 for each item, being careful not to change scales.
3. Many small judgments are better than large rough adjustments because of the theory of off-setting errors. Too big a range in scoring implies drastic differences between the worst and the best.

EXHIBIT #1

Basic Information of residential Multi-Family Land Sales Comparables

Factors	420 W. Wilson No. 1	219=N. Frances No. 2	102 N. Franklin No. 3	434 W. Hiffiin No. 4	427 W. Main No. 5
Sales Price	$ 84,950	$48,000	$86,900	$160,000	$53,000
Sales Date	'73	'72	'72	'72	'72
Type of Deed	WD	WD	WD	WD	WD
Volume and Page	403/510	346/561	334/ 23	337/215	342/113
Grantor	R.A. Paape Co.Inc.	Work of God, Inc.	Brown, Emily	Voss, Rob't	Hiller + wife
Grantee	Hillmark,Dev. Corp.	Hillmark Corp.	Courtyard Assoc.	American United Investment	Hillmark Corp.
Land Area	13,068	7,920	15,246	26,400	8,712
Zoning	R-6	R-6	R-6	R-6	R-6

All have city services, sidewalk and street improvements
No adjustment for time required as residential economics would not permit inflation of land prices.

Landmark Research, Inc.

EXHIBIT #2

Vacant Land Market Comparison
Residential Use Land Price: Mean

Comparable Sales

Factors	420 W. Wilson No. 1	219 N. Frances No. 2	102 N. Franklin N. 3	434 W. Mifflin N. 4	427-31 W.Main No. 5	Mean (X) 1-5
Sales Price	$84950	$48000	$86900	$160000	$53000	$432850
Date of Sale	'73	'72	'72	'72	'72	
Land Area (sq.ft.)	13068	7920	15246	26400	8712	71346
No. of Dwelling Units Built	43	24	43	73	24	207
Total Gross Bldg.	20070	12670	24364	43040	10900	111044
Total # Rms Blt.	65.5	38	65.5	130.5	40	339.5
Mean Land Price - $/per:						
1. Square Ft. of Land	$6.50	$6.06	$5.60	$6.06	$6.08	$6.06
2. Dwelling Unit Blt.	$1976	$2000	$2020	$2192	$2208	$2079
3. Total Gross Bldg. Floor Area	$4.23	$3.79	$3.79	$3.72	$4.86	$4.08
4. Total # Rms Blt.	1297	1263	1327	1226	1325	1288

Landmark Research, Inc.

4. Note that Exhibit 7 provides an objective scale for most factors so that the reader can understand the score. The weights in this case were corroborated in the narrative of the report from a 1968 study by Real Estate Research Corporation.

C. All calculations for establishing the "a" and "b" factors for linear regression appear in Exhibit #8 and are charted in Exhibit #9.

D. An example using restaurant sites in Madison is provided in Exhibits 10, 11, and 12.

E. An example of a single family appraisal is provided in Exhibits 13, 14, 15, and 16.

F. A fourth example comparing old store buildings in downtown Madison will be provided in a demonstration appraisal.

Exhibit 3

Vacant Land Market Comparison
Multi-Family Residential Use Land Price
Mean & Standard Deviation

	Comparable	Land Price/ Comparable Unit	$\bar{X}-X$	$(\bar{X}-X)^2$	Mean Deviation $MD = \frac{\leq \bar{X}-X}{n-1}$	Standard Deviation $S = \sqrt{\frac{\leq(\bar{X}-X)^2}{n-1}}$
Land Price Per:						
Sq. Ft. of Land	1	$6.50	.44	.19		
(Row #1, Ex. #6)	2	6.06	0	0	.92 / 4	.44 / 4
	3	5.60	.46	.21		
	4	6.06	0	0		
	5	6.08	.02	.04	$.23	$.33
Total		$30.30	.92	.44		
Mean (sum xi's / n)		$ 6.06				
No. of DU Built	1	1976	53	2809		
(Row #2, Ex. #6)	2	2000	29	841	433 / 4	62341 / 4
	3	2020	9	81		
	4	2192	163	26569		
	5	2208	179	32041	$108	$249.68
Total		$10396	433	62341		
Mean		$ 2079				
Total Gross Bldg.						
Area Built	1	4.23	.15	.02		
	2	3.79	.29	.08	1.87 / 4	.92 / 4
	3	3.79	.29	.08		
	4	3.72	.36	.13		
	5	4.86	.78	.61	$.465	$.48
Total		$20.39	1.87	.92		
Mean		$ 4.08				
Total No. Rooms Built	1	1297	9	81		
(Row #3, Ex. #6)	2	1263	25	625	172 / 4	7440 / 4
	3	1327	39	1521		
	4	1226	62	3844		
	5	1325	37	1369	$43	$43.13
Total		$6438	172	7440		
Mean		$1288				

Landmark Research, Inc.

EXHIBIT #5

Industrial Land Sales Selected as Comparables
to MG & E Subject Parcel

		Date of Sale	Price	Public Record	Square Feet	(Acres)	$/Sq. Ft.
1.	MATC	6/8/67	$108,750	Confirmed by MATC Finance Director	152,460	(3.5)	.71
2.	MATC	1/23/67	75,000	Vol.828,p.280	81,828	(1.88)	.92
3.	Gorman	12/20/65	17,500	Vol.436,p.463	21,060	(.48)	.83
4.	Holfman	6/5/64	15,000	Vol.779,p.558	17,050	(.39)	.88
5.	Garrett	5/31/63	12,000	Vol.758,p.226	13,932	(.32)	.86
6.	Madison Transit	1/4/68	55,000	Vol.4,p.358	211,701	(4.86)	.26
7.	Madison Trust	12/28/66	45,000	Vol.828,p.204	67,900	(1.56)	.66
8.	NW Mutual	9/9/66	117,500	Vol.824,p.144	138,521	(3.18)	.85

Property Location Map

EXHIBIT #6

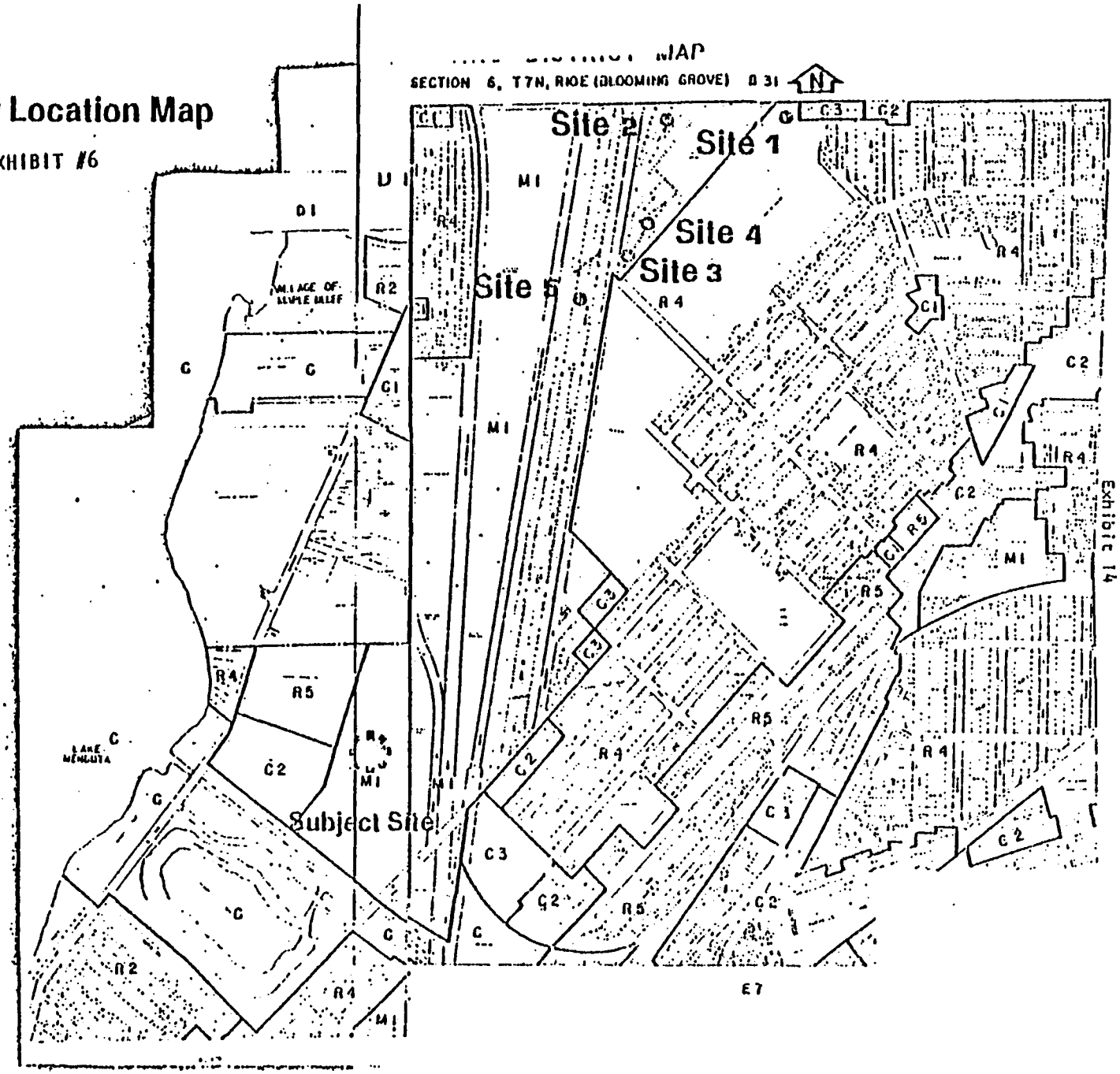
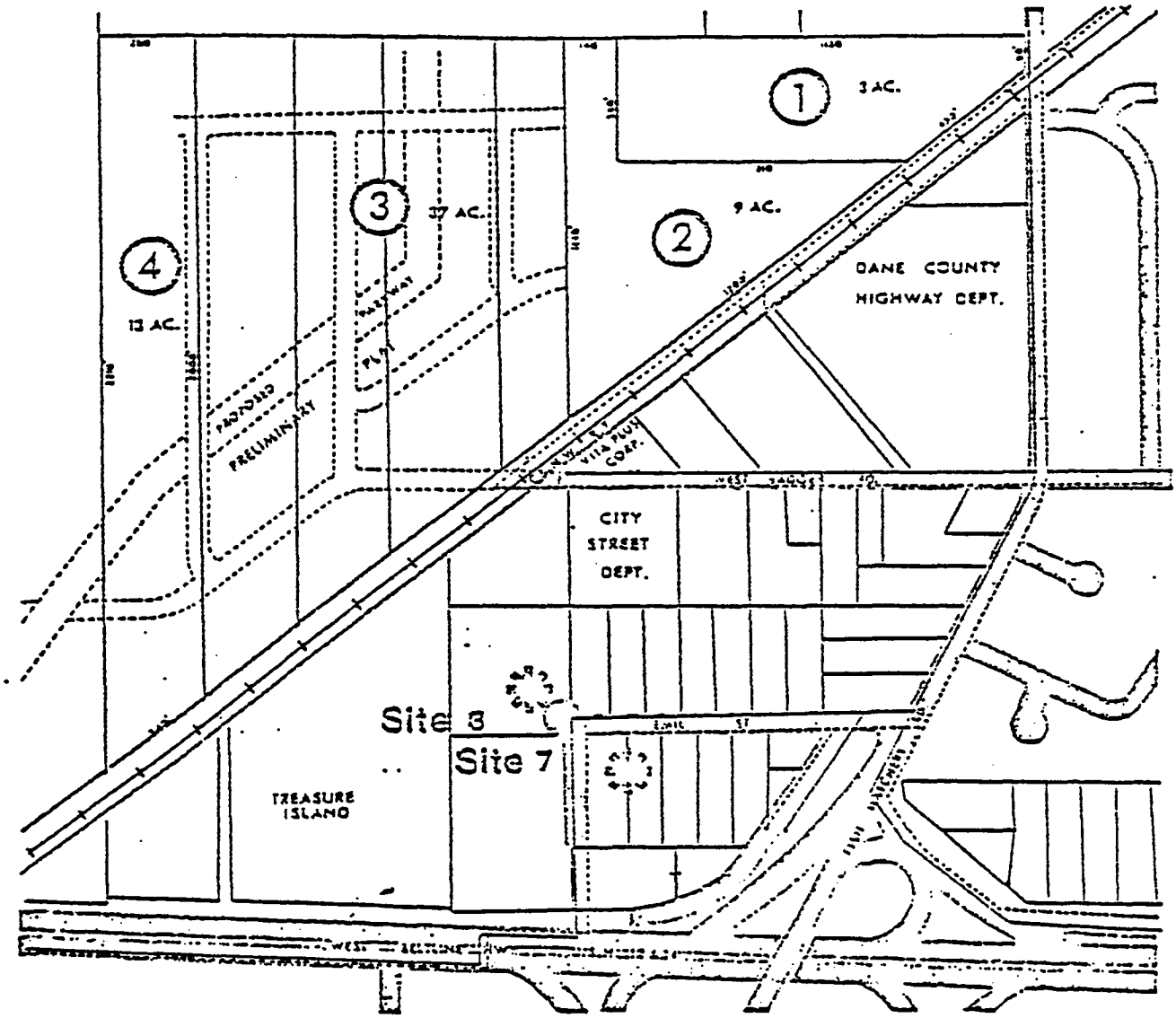


EXHIBIT #6 continued

MADISON WISCONSIN

INDUSTRIAL SITE MAP



LEGEND

WATER

SAN. SEWER

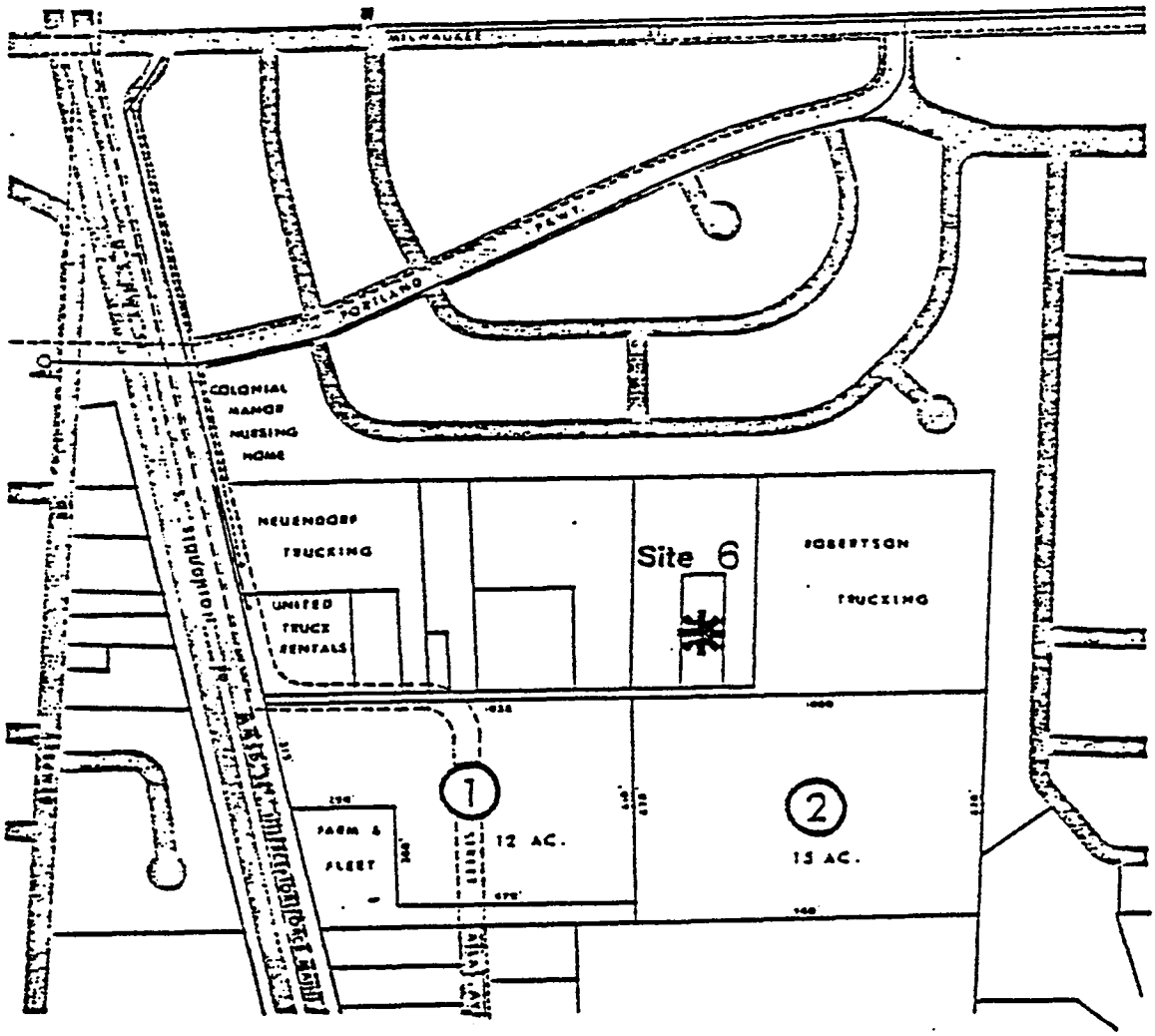
PREPARED BY ECONOMIC DEVELOPMENT SECTION - MADISON CITY PLANNING DEPARTMENT

EXHIBIT #6 continued

MADISON WISCONSIN

INDUSTRIAL SITE MAP

SIEM C-3



LEGEND

WATER

SAN. SEWER

NORTH

SCALE 0 400 800

PREPARED BY ECONOMIC DEVELOPMENT SECTION · MADISON CITY PLANNING DEPARTMENT

EXHIBIT #7

Quality Scores & Weight Per Category

		Weight
1.	Size (Marketability Factor) 0 - 1 acre = 5 over 1 - 3 = 4 over 3.5 -10 = 3 over 10 - 20 acre = 2 over 20 acre = 1	20
2.	Accessibility to all areas (in terms of distance and time) 1-5 where 5 = premium + 3 = average	20
3.	Visibility from major artery 1-5	15
4.	Availability of sewer/water at site 1-5	15
5.	Availability of rail 1-5	10
6.	Soils and topography	20
		100%

Exhibit 16

Table of Scores for Comparable Properties

	1	2	3	4	5	6	7	8	Subject
Size	3	4	5	5	5	3	4	4	1
Access	4	4	4	4	4	2	3	3	4
Visibility	5	5	5	5	4	1	1	2	5
Sewer/water	5	5	5	5	5	2	5	5	5
Rail	1	1	1	1	3	1	2	2	4
Soils	2	3	2	2	2	4	5	5	1

Feature	Weight	Weighted Ratings 1	2	3	4	5	6	7	8	Subj
Size	20	60	80	100	100	100	60	80	80	20
Access	20	80	80	80	80	80	40	60	60	80
Visibility	15	75	75	75	75	60	15	15	30	75
Sewer/water	15	75	75	75	75	75	30	75	75	75
Rail	10	10	10	10	10	30	10	20	100	40
Soils	20	40	60	40	40	40	80	100	100	20
Total		340	380	380	380	385	235	350	365	310
Price/Sq. Ft.		.71	.92	.83	.88	.86	.26	.66	.85	

EXHIBIT #8

Least Squares Regression

Model $Y = a - b X$
where Y = estimated land value per square foot
X = weighted quality ratings

Comparables	Y	X	Y^2	X^2	XY
1	.71	340	.504	115600	241.400
2	.92	380	.846	114400	349.600
3	.83	380	.689	114400	315.400
4	.88	380	.774	114400	334.400
5	.86	385	.740	148225	331.100
6	.26	235	.068	55225	61.100
7	.66	350	.436	122500	231.000
8	.85	365	.723	133225	310.250
	Σ=5.97	Σ=2815	Σ=4.779	Σ=1007975	Σ=2174.25

Step 2: Compute mean of Y and mean of X

$$\overline{Y} = \frac{\Sigma Y}{n} = \frac{5.97}{8} = .746$$

$$\overline{X} = \frac{2815}{8} = 351.875$$

Step 3: Compute Σy^2, Σx^2 and Σxy

$$\Sigma y^2 = \Sigma Y^2 - n(\overline{Y})^2$$
$$= 4.779 - 8(.746)^2$$
$$= 4.770 - 8(.557)$$
$$= 4.779 - 4.452$$
$$= .327$$

$$\Sigma x^2 = \Sigma X^2 - n(\overline{X})^2$$
$$= 1007975 - 8(351.875)^2$$
$$= 17446.873$$

$$\Sigma xy = \Sigma XY - n\,\overline{XY}$$
$$= 2174.25 - 8(.746)\ (351.875)$$
$$= 2184.25 - 2099.99$$
$$= 74.26$$

Step 4: $b = \frac{\Sigma xy}{x^2} = \frac{74.26}{17446.873} = .04256$

Step 5: $a = \bar{Y} - b\bar{X}$

$= .746 - .004256\ (351.875)$
$= -.7517$

Hence $Y = -.7517 + .004256\ (X)$
$Y_n = -.7517 + .004256\ (310)$

$= .56765$ say .57

Step 6: Compute standard error

$$Sy.x = \sqrt{\frac{\Sigma y^2 - b\Sigma xy}{n-2}}$$

$$= \sqrt{\frac{1327 - .004256\ (74.26)}{8-2}}$$

$$= \sqrt{\frac{.10949}{6}}$$

$$= \sqrt{.001825}$$

$= .042719$ say $.04

Step 7: Compute r^2

$$r^2 = \left[\frac{\Sigma xy}{\Sigma x^2 \Sigma y^2}\right]$$

$$= \left[\frac{74.26}{(17446.873)(.327)}\right]$$

$= .9665$

EXHIBIT #9

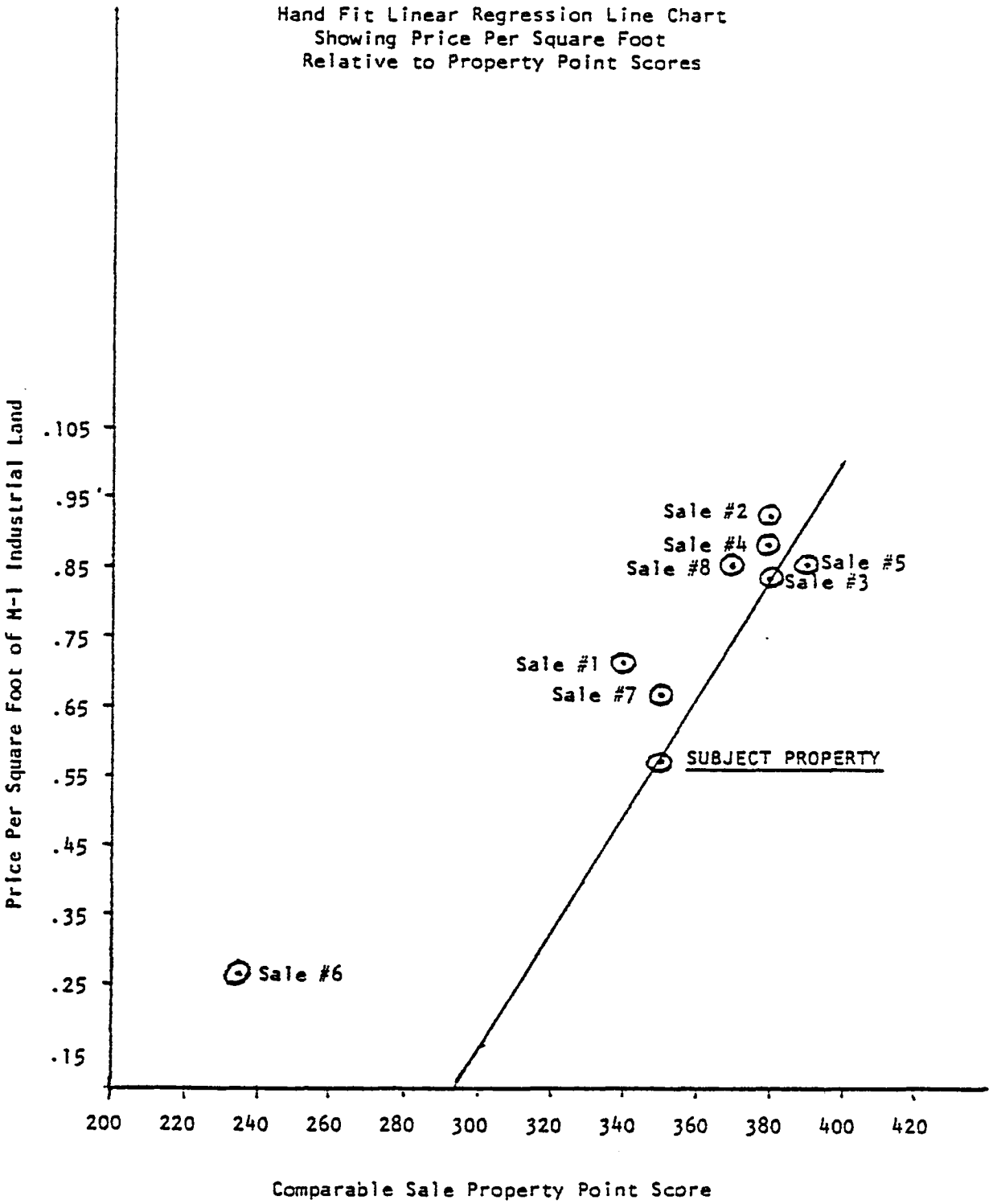

Hand Fit Linear Regression Line Chart
Showing Price Per Square Foot
Relative to Property Point Scores
Price Per Square Foot of M-1 Industrial Land
.105
.95
.85
.75
.65
.55
.45
.35
.25
.15
Sale #2
Sale #4
Sale #8
Sale #5
Sale #3
Sale #1
Sale #7
SUBJECT PROPERTY
Sale #6
200
220
240
260
280
300
320
340
360
380
400
420
Comparable Sale Property Point Score

EXHIBIT #10

Basic Information on Restaurant-Commercial Land Sale Comparables

	Barnaby's East	Barnaby's West	Bud's West	Pigs Ear East	Marc's Big Boy South	Marc's Big Boy East
Sales Price	$92,000*	$89,000	$75,700	$91,000	$87,500	$85,000
Sales Date	10-6-70	6-30-70	6-29-71	5-20-72	9-3-69	3-15-68
Type of Deed	Lease with Option	WD	WD	WD	WD	WD
Volume & Page	209-455	184-75	264-173	344-385	130-463	15-108
Grantee	Barnaby's Inc.	Barnaby's Inc.	Clyde Chamberlain	Poole, Inc.	B & G Realty	B & G Realty
Area	38,211	32,900	45,236	141,570	38,327	30,237
Zoning	C-2	C-3-L	C-3-L	M-1	C-2	C-2
Principal Business Frontage	E. Washington Ave.	Mineral Point & Grand Canyon Roads	Odana Rd.	Cottage Grove Road & Atlas Avenue	S. Park Street	E. Washington Ave.
Position on Block	Inside lot	Corner lot	Inside lot	Corner lot	Corner lot	Inside lot

All have city services, Pigs Ear did not have curb and gutter
No adjustment of time required as restaurant economics would not permit inflation of land prices.

EXHIBIT #11

Attribute Point and Weight Comparison
Of Restaurant-Commercial Land Sales and Subject Property

	(See Exhibit #8)	Barnaby's East		Barnaby's West		Bud's West		Pigs Ear East		Marc's Big Boy South		Marc's Big Boy East		Subject	
30	*Site	Points	Wgt'd Pts												
	Shape	5		1		5		3		5		3		5	
	% Usable	3		3		5		5		5		5		1	
	Site Preparation	3		1		5		5		5		5		5	
	Visibility	3		5		5		3		5		3		3	
	Access														
	Left & Right Turn	5		5		5		3		3		3		1	
	Frontage Road	3		5		5		1		5		5		5	
	Total	18		20		25		20		28		24		20	
	Weight		540		600		750		600		840		720		600
50															
	Linkages														
	Traffic Volume	5		5		3		3		5		5		3	
	Supportive Retail/Serv.	5		5		3		1		1		3		1	
	Proximity to Multi-Family Residential	1		5		5		1		3		3		3	
	Proximity to Employm.	3		3		3		1		1		5		3	
	**Interstate-Beltline	2		1		1		3		2		2		1	
	Total	15		18		15		9		12		18		11	
	Weight														
20	Image														
	Development Activity	5		5		3		1		1		3		1	
	Prestige of Street Address	5		5		3		1		3		5		1	
100	Total	10		10		6		2		4		8		2	
			200		200		120		40		80		160		40
	*Scale 1,3,5 Except **		1490		1700		1620		1090		1520		1780		1190

EXHIBIT #12

Determination of Linear Regression
Weighted Mean Value of Land/sf
Commercial-Restaurant

Comparable	1 Land $/sf Yi	2 Total Wgtd. Pts. Xi	3 (Land $/sf)^2 Yi^2	4 (Wgtd.Pts)^2 Xi^2	5 (3 x 4) XiYi
1	$2.40	1490	5.76	2220100	3575
2	2.73	1700	7.45	2890000	4641
3	1.67	1620	2.79	2624000	2705
4	.64	1090	.41	1881000	698
5	2.28	1520	5.20	2310400	3466
6	2.81	1780	7.90	3168400	5002
TOTAL	$12.53	9200	29.51	15093000	20087
Mean	(Y)=$2.09	(X)=1533			

Calculations of Mean, Standard Deviation

$$\text{Sum } y^2 = Y^2 - n(Y)^2$$

$$= (29.51)^2 - 6(2.09)^2$$

$$= 845$$

$$\text{Sum } x^2 = X^2 - n(X)^2$$

$$= 1509300 - 6(1533)^2$$

$$= 993366$$

$$\text{Sum } xy = XY - n(x)(Y)$$

$$= 20087 - 6(1533)(2.09)$$

$$= 863$$

$$Y' = a + bX_{subject}$$

$$b = \frac{\text{Sum } xy}{\text{Sum } x^2} = \frac{863}{993366} = .00087$$

$$a = (Y) - b(X) = \$2.09 - .00087(1533)$$

SALES PRICE/SUBJECT SITE

$$Y' = a + bX_{subject}$$

$$= -\$.76 = .00087(1190) = \$1.80$$

STANDARD DEVIATION

$$S_{xy} = \frac{\text{Sum } y^2 - b(\text{Sum } xy)}{n-2}$$

$$= \$ .15$$

10-2-73

EXHIBIT #13

Buyer Characteristics in Dudgeon School Area

1. 636 Crandall Street
Married couple, 27 years old - one year old child - college degrees - salary $10,000 per year
Valued protected play area for child, convenient location on bus line, remodeled kitchen, house with character within price range and possibility to build equity. They are having home rewired and doing minor maintenance required themselves. Financed with a conventional mortgage and second mortgage from state VA
Relative importance of buyer factors reported by interviewer:

Physical condition	10
Interior space	25
Mechanical equipment	10
Location & neighborhood	25
Financial operating burden	25
lot	5
	100

2. 821 Minakwa
26 year old couple, no children - project manager - college degree $10,000 salary.
Primary motivations were: house had more character and value than a new house for the same price, location for bringing up children, mechanicals in good condition and fireplace. Lot was considered a drawback.

3. 3120 Gregory
Man and wife in mid -forties, no children - needed three bedrooms with full dining room and 2-stories high, wanted a two car garage but settled for one, Preferred west side for convenience and more value appreciation.
Purchased house expecting to repaint entire building.
Buyer reported purchase price of $24,000

4. 2455 Mohawk Dr.
Married couple, 27 years old, no children, both work with college educations.
Husband gave major weight to structural soundness, neighborhood appeal, and location near bus line and beltline.
Wife gave preference to wooded neighborhood and outdoor yard, and space utilization inside. Mechanical and storage were given only medium emphasis.

5. 645 Sheldon St.
28 year old married couple, no children, college educated.
They preferred home with garage, fireplace, close to bus line, and on west side between campus, square and Hilldale. Wanted garden.
Physical condition was rated highly, exterior appearance was not important.
Lot size was more important with mechanical and interior condition less important.

6. 1510 Whenona Drive
Married couple (approximately 30) - 2 children, ages 3 and 5 - college degrees - father, $10,000; wife works as a nurse.
Couple emphasized structural soundness as they expected to remain in house more than 10 years and possibly add a room at the rear. They wanted good sized rooms and visual appeal or character of an older home in a stable neighborhood. Valued location for convenience and stability of value and knew other young couples were moving in with plans to fix up their homes, too. They did not expect mechanical equipment to be modern in an old home and expected to update the kitchen eventually.
Off-site factors were taken for granted except for bus which wife used every day for work.

Ratcliff Linear Regression

EXHIBIT #15

$$Y = a + bx$$

$$b = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{n(\Sigma x^2) - \Sigma(x)^2}$$

$$a = \frac{Y - b(\Sigma x)}{n}$$

$n = 7$	The number of comparables.
$\Sigma Y = 164,200$	The sum of the seven actual prices paid for the comparables. ($26,300) + ($24,500) + ($23,800)....
$(\Sigma y) = 164,200$	
$(\Sigma x) = 2840$	The sum of the total weighs for the comparables. (260) + (360) + (400) + (440) + ...
$(\Sigma xy) = 65,916,000$	(260)(26,300) + (360)(24,500) + ...
$(\Sigma x)(\Sigma y) = 465,328,000$	(2840)(164,200)
$\Sigma(x)^2 = 8,065,600$	$(2840)^2$
$(\Sigma x^2) = 1,186,200$	$(260)^2 + (360)^2 + (400)^2 + (440)^2 +$.

$$b = \frac{7(65,916,000) - (465,328,000)}{7(1,186,200) - (8,065,600)} = -16.467619 \simeq -16.5$$

$$a = \frac{164,200 - (-16.5)(2840)}{7} = 30,151.428 \simeq \$30,151.$$

$$Y = a + bx$$

$$Y = 30,151 + (-16.5)(x)$$

'x' for the subject property was 400

$$Y = 30,151 + (-16.5)(400)$$

$$Y = \$23,550$$

APPENDIX II

Vacant Land Market Comparison
Office Use
Subject - Fauerbach Property

Weight Total	Weight Sub Total	Factor	CMI Wgt	CMI Wgt*	VIP Wgt	VIP Wgt*	Doty School Wgt	Doty School Wgt*	WPS-1 Wgt	WPS-1 Wgt*	IBM Wgt	IBM Wgt*	WPS-2 Wgt	WPS-2 Wgt*	Subject Wgt	Subject Wgt*
30		Site														
	10**	Intensity of Land Use	8	80	10	100	6	60	4	40	2	20	2	20	6	60
	10**	Topography	10	100	8	80	6	60	4	40	1	10	4	40	6	60
	10**	Views	8	80	6	60	4	40	8	80	4	40	4	40	6	60
25		Image														
	10**	Lineal Ft Lake/Park	10	100	4	40	4	40	8	80	6	60	1	10	8	80
	5	Lake Exposure	5	25	3	15	3	15	3	15	1	5	1	5	3	15
	10**	Community Recognition	10	100	8	80	8	80	6	60	4	40	2	20	2	20
35		Linkages														
	15**	Downtown	8	120	10	150	8	120	4	60	1	15	1	15	4	60
	5	Auto Approach Zone	5	25	3	15	3	25	2	10	2	10	1	5	3	15
	5	Ancillary Uses	3	15	5	25	3	15	3	15	1	5	2	10	1	5
	5	Employee--Housing & Transportation	3	15	3	15	3	15	1	5	3	15	3	15	3	15
	5	Protection from adverse Contiguous Uses	5	25	4	20	3	15	3	15	4	20	2	10	1	5
10		Construction Suitability														
	5	Depth to Ground water/ Soils	5	25	5	25	3	15	1	5	1	5	2	10	3	15
	5	Drainage	5	25	5	25	3	15	3	15	1	5	3	10	3	15
100	100	Totals		735		650		515		440		225		210		425

* Weight x Scale
** 10 Point Scale

$b = \frac{\text{Sum } xy}{\text{Sum } x^2} = .0249$

$a = Y - bX = -\$5.75$

$Y' = a + bX_{subject}$

$= -\$5.75 + .0249(425)$

$= \underline{\$4.83}$ per sq. ft. ± $ .08 (standard deviation)